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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/045,515	10/26/2001	Tsutomu Tanaka	A5015/T40100	2999

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APPLIED MATERIALS, INC.  
2881 SCOTT BLVD. M/S 2061  
SANTA CLARA, CA 95050

EXAMINER

JONES, STEPHEN E

ART UNIT PAPER NUMBER

2817

DATE MAILED: 04/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/045,515

Applicant(s)

TANAKA ET AL.

Examiner

Stephen E. Jones

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-4,9-11 and 14-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4,9-11 and 14-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Election/Restrictions***

1. Applicant's election without traverse of Species I. (Figs. 5, 7A, and 7B) in Paper No. 7 is acknowledged.

Applicant canceled claims 5-8 and 12-13. All of the remaining claims read on the elected species.

***Specification***

2. The disclosure is objected to because of the following informalities:

On page 5 (line 31), should the term "register" read as --resistor-- since it is referring to a termination?

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas.

Thomas (Fig. 3) teaches a coaxial hybrid coupler junction including: a pair of coaxial lines (11 and 16) are spaced apart by insulation of a uniform thickness over the inductive distance (i.e. the lines are side by side in parallel) (see Col. 2, lines 24-25) (Claim 4); energy (i.e. ac power) is supplied to one of the terminals (A, B, C, D) of the lines (see Col. 2, lines 40-41); the energy divides (inherently inductively as is conventional in spaced couplers) between the opposite terminals (B and C); and the impedance is constant along the inductive length (i.e. impedance matched along the length) (see Col. 2, lines 24-26). Thomas also teaches that the conductors (11 and 16) can be an odd multiple of a quarter wavelength (see Col. 2, lines 50-52). Also, note regarding Claim 1, since the first transmission line has a port then it can be coupled to an ac power source, and since the second transmission line has a port then it can be coupled to a load.

However, Thomas does not explicitly teach that the inductive length of the conductors (11 and 16) are at least one wavelength (Claim 1).

It would have been considered obvious to one of ordinary skill in the art to have chosen to make the odd multiple of a quarter wavelength five, especially since five is a known odd multiple and would have provided at least a wavelength and Thomas suggests odd multiples as a modification.

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thomas in view of Heiter.

Thomas teaches a coupler as described above. Thomas also refers to reflectionless terminations (e.g. see Col. 2, lines 39-43). However, Thomas does not explicitly teach a trimming element coupled to the first transmission line and coupled to ground.

Heiter teaches using a resistor (e.g. 72) connected to an unused port of a coupler (e.g. 46) and coupled to ground.

It would have been considered obvious to one of ordinary skill in the art to have included a resistor element such as taught by Heiter between the unused port of the first transmission line and ground in the Thomas structure, because it would have provided the advantageous benefit of dissipating (i.e. trimming) reflections (see Col. 3, lines 36-44 of Heiter), thereby suggesting the obviousness of such a modification.

7. Claims 2, 9-11, and 14-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barnes et al. (cited by applicant) in view of Thomas.

Barnes (Fig. 1) teaches a plasma processing system including: an RF source generator (14) connected to a directional coupler (36); the coupler is connected to a plasma processing chamber for substrates (see Col. 1, lines 26-30) (Claim 18 subject matter); and the typical source frequency is 13.56 MHz.

However, Barnes does not explicitly teach that the coupler is a matching network having two transmission lines coupled over an inductive length (Claim 19) which is at least one of a wavelength (Claims 9, 14), that the first line receives the ac energy from

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the source and the second line receives the energy from the first line and the second line delivers the energy to the plasma (Claim 10), that the lines are parallel (Claim 11), that the inductive length is between 3000 and .12 meters (Claim 15) or between 857 and .75 meters (Claims 2, 16, and 17).

Thomas teaches an in phase quadrature coupler as described above. Thomas also teaches that energy can be applied to the first line (e.g. port A) and outputted from the second line (e.g. port B) (see Col. 2, lines 40-45)

Regarding Claims 10, 11, 18, 19, it would have been considered obvious to one of ordinary skill in the art to have substituted the quadrature hybrid coupler such as taught Thomas in place of the generic directional coupler in the Barnes et al. device, because both directional couplers and the quadrature hybrid coupler are art recognized functionally equivalent 90 degree out of phase port coupler means, thereby suggesting the obviousness of such a substitution.

Furthermore (regarding Claims 9 and 14), it would have been considered obvious to one of ordinary skill in the art to have chosen to make the inductive length of the conductors to have an odd multiple of a quarter wavelength be five in the combination of Barnes and Thomas, especially since 5 is a known odd multiple and would have provided at least a wavelength and Thomas suggests odd multiples as a modification.

Also, regarding Claims 2, 15, 16, and 17, it would have been considered obvious to one of ordinary skill in the art to have the inductive length be between 3000 and .12 meters or between 857 and .75 meters, because Barnes teaches a typical frequency of 13.56 MHz and the length is related to the frequency (i.e. wavelength is equal to  $c/f$ ) and

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with the odd multiple of 5 described in the previous paragraph the length would be within the ranges stated in the present claims.

**Conclusion**

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Chapell (U.S. Patent No. 4,641,111) teaches a microwave coupler having two lines.


Chapell (U.S. Patent No. 5,148,132) teaches coupled line devices.

Guanella teaches balancing units.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen E. Jones whose telephone number is 703-305-0390. The examiner can normally be reached on Monday through Friday from 8 AM to 4 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert J. Pascal can be reached on 703-308-4909. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-6251 for regular communications and 703-308-6251 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

  
Stephen Jones  
Patent Examiner  
Art Unit 2817

SEJ  
April 3, 2003